

with hangings of matting, that can be removed at pleasure and so leave every part open to the sun or the wind. Very frequently a sudden gust entering in this manner lifts the roof off, and bears it away, leaving only the upright timbers in the ground. By keeping careful watch on the winds these accidents can be avoided.

Since we have a large expanse of the world's surface to travel over in the present sketch, we now take a flying leap to California. There the Indian savages dwell in habitations of a most peculiar construction. They are large and roomy: the side-walls are low, and formed of posts, connected by a thatch, and plastered with clay, which hardens in the sun, and forms a solid defence against the weather. The roof is broad, high, and sloping, formed by a thick, warm, and heavy thatch, with cross-beams of rough wood and rafters laid lengthwise to assist in the support. These meet in the central line, where a strong timber runs the whole length of the building, upheld by rough trunks of trees, with forked branches left to aid in bearing up the ponderous roof. The floor is the earth, beaten hard, with piles of dried grass to serve as couches.

Among some of the wilder tribes, mere huts built of branches, and thatched with leaves and ropes of grass, constitute the dwellings of the people. As we approach the borders of the United States, beyond the snowy mountains, the well-known Indian wigwam takes the place of the more curious construction; and with these the public has now been made too familiar to render it necessary we should sketch them here. But we would wish the reader who peruses the present remarks to carry along with him, in his mind, a comparison between the dwellings of the untaught races of the wild regions we allude to and the magnificent habitations which civilization has erected for her children.

If we were strictly to describe the domestic architecture of all savage nations, we should be compelled to give an account of the palaces of those twin cities of barbarians, St. Petersburg and Peking, with many other towns, which the simple reader might be started to find placed within such a category. But we must, from so strict an adherence to the subject, refrain and proceed to those waste regions, the convict colonies of Russia, the snowy wildernesses of Siberia, where man, under the paternal sway of the Christian Czar, is as degraded and debased as under the despotism of Whang tee Fou, or any other imperial savage that ever sat on his proper seat, a throne.

The Bashkirs that dwell in the wild deserts south of Yehaterinburg, in Siberia, live half the year in portable tents, which they bear about from place to place, and during the other half inhabit small snug wooden huts, always built on the border of some wood. There is nothing peculiar in their construction. They are just such structures as might be supposed to be erected by instinct, by men having plenty of timber at hand, in want of houses, and without knowledge of the rules of art, even in its simplest rudiments. There is art, there is science, in domestic architecture, as in all other things affecting the welfare and comforts, and guided by the civilization, of its people. A house well built is a monument of its builder's skill, and as the writer of a book is proud of his production, as the painter of a picture is gratified by the contemplation of his work, as the sculptor's eye glows on the survey of his statue, so the architect delights in the view of a magnificent structure raised by skilful workmen under the superintendence of his scientific eye. But among savage races, shelter is the only object sought; and when the plan of a dwelling is once formed, it is copied by succeeding generations, so that each man's house is like that of his neighbour, and the habitations of one age are the reproductions of the last. Barbarians, like birds and beavers, seem to do all things by instinct.

Some of the Russian settlements possess good houses, built of timber, and commodiously arranged; but with a singular economy of the interior space, as well as a disregard for comfort, the staircase is outside, running up the wall, with an entrance midway into the upper story. Only in a few places is this not the custom. In the inside the beams and joists are not hidden by planking, but cased

in coverings of polished fir wood, the material of which all benches and tables are made. But these houses are inhabited by the aristocracy of Siberia. The humble people dwell in others of far different, as well as very varied descriptions. Armar, a German traveller, visited some of the Ostyak yurts, or huts. Approaching them over the plain, he saw nothing more than what appeared to be low mounds of snow, with small openings, through which a ruddy light streamed over the white ground, and bright sparks and flakes of fire crackled and flew out through the darkness.

"Stooping through the door, we entered the hut, the floor of which was a good deal lower than the ground. Opposite to the entrance was burning a brisk fire on a raised hearth of clay, in which, in accordance with the Vogul and Tartar custom, an iron pot was sunk. The fire required to heat this lay deeper than that which warmed the room. The fire hearth and fire place occupying a width of 4 feet, reached nearly to the wooden wall of the building, which was protected from the flames by a layer of clay, a foot thick. A cylindrical flue of the same material, connected with the back of the hearth, rises perpendicularly to the roof. The flue is about a foot and a half wide, but enlarged to 3 feet immediately above the fire. Some broken places in this piece of work, allowed us to see how it was constructed, and on this subject we afterwards received ample information in the yurts which we subsequently visited. A frame work of rods and ledges, cylindrically shaped, is plastered over with soft clay."

We should like to see at the approaching Exhibition of the Industry of All Nations one of these chimneys of basket-work and clay placed by the side of the model of a chimney in some London mansion. The contrast would be a strong illustration of the progress made in the domestic arts by the savage and civilized races.

Round the interior of the yurt ran a raised platform of clay, about 6 feet high, sacred during the day to the women and children, but used at night as the sleeping place of the family.

In another village near this the yurts were square, built on a massive plan and heaped over with earth, which again, heaped over with snow, rendered the interior as warm as an egg-batching oven. Between each building clusters of rough bushes grow, which give to the place in summer a most cheerful and picturesque appearance, especially as the huts are then overgrown with the scanty vegetation of the region, so that on entering one of them you appear to be penetrating some mound of fruitful earth, scooped out by nature or the industry of man. In the interior the raised platform is divided by partitions reaching to the roof into a number of separate chambers: these all open towards the middle of the hut and the hearth, so that each is equally warmed.

The Sosnovian yurts are still stronger buildings. They are square in shape, and built of heavy logs planed and laid one upon the other, with others from wall to wall forming the roof. Against each wall large quantities of earth are piled. The entrance is always on the south side, and only half the height of a man.

Facing the east is a small square opening left between the logs for a window, and closed by a block of ice a foot thick, propped from without by a pole thrust into the ground. A supply of such heavy flakes of ice lies before each habitation. The fire on the earth thaws the interior surface of the ice-window, rendering it as smooth as a mirror. The outside is rough, yet a light, whiter and clearer, penetrates through this window, than those glazed by fish or dried fish-skins, which are commonly used. When one block is melted another supplies its place.

In the centre of each assemblage of huts are other edifices of a strong construction. They are erected on strong wooden piles, eight or ten feet high, and ascended to by a notched pole, serving as a ladder. The elevation from the ground is adopted to preserve the interior from the thievish visits of dogs, since the place serves as a magazine of provisions.

As we penetrate still deeper in the interior of these remote and little known countries, we find the people dwelling in moveable habitations, composed of a tall peaked frame of wood, covered with layers of reindeer skins,

laid in the manner of slates or tiles, with the edge of one overlapping the other, and so on, from the top to the ground. At the bottom the snow is thrown up and beaten hard all round this singular dwelling, while, at the summit, a small opening is left for the exit of smoke.

The Yakuts inhabit one description of houses in winter, and another totally distinct in summer. The dwellings for the cold season are low clumsy huts, plastered thickly with cow-dung and earth. The doors are heavily curtained with coarse hairy hides, and the windows glazed with ice. The whole, covered with snow, is sufficiently warm and comfortable. The summer habitations are composed of lofty conical frames, formed of slight poles, 20 feet high, woven together with broad bands of a beautiful shining yellow bark, which is perfectly flexible. Each strip of this singular and useful material is sewn to the next with a strong horsehair thread. Seen from a distance these dwellings appear like tall yellow bee-hives, embrowned in variegated lines.

There are innumerable little variations in the structure of the dwellings among these wild and strange tribes of men, but they are generally alike in the main peculiarities. The reader will have perceived from this slight sketch of their domestic architecture, to what stage of progress they have arrived,—for we conclude as we commenced, by saying that, in all times, and among all men, the style of building habitations is a fair standard of climate, civilization, and general character. To form some rough idea of the manners, customs, and tastes of a people,—the temperature and condition of a region,—and the progress it has made in the arts and processes of refined life, we have only to enter the dwelling-house, and observe its characteristics. Even in our own country, with all our infinite varieties of position, of taste, and character, we form from a glance at the economy of a house some notion of its inmates. Apply this test to the races of the world, and the result will be no deception.\*

#### THE SEVEN-MILE TUNNEL THROUGH THE ALPS.

THE following details are gathered from Dr. Granville's paper, as promised.

To give at once some idea of the boldness of Chev. Mons' undertaking, we may, in the first place, state that in its progress the tunnel must pass under some of the most elevated crests of Mont Cenis,—one, in particular, where there will be 4,950 feet of mountain, capped with eternal glaciers, over head, at the middle of the tunnel, so that not only will the workmen and machinery in construction, and the passengers and trains in transit, be buried to that depth in the heart of the mountain, but all idea of shafts, either to facilitate excavation, or to promote ventilation, must be out of the question. The breath of life itself must be respired, from either extremity, with artificial aid, in shape of currents of fresh air transmitted, and of foul withdrawn, by mechanical apparatus ever at work, at least during excavation, which is also itself to be effected by machinery of a new and simple nature, worked by water power of mountain streams whereby the trains are also to be run through the tunnel, which ascends, from the northern or Savoy side, at Modane, all the way to its exit at Bardonnèche, with a gradient equal to 19 in 1000.

The excavating machinery consists of—

1. Two great hydraulic wheels, 15 feet in diameter, which move—
2. Two pulleys (with an endless cable twice round them) placed horizontally, and of 30 feet diameter, performing 22½ revolutions in a minute.
3. An endless cable connected with the cutting or excavating machine. This cable will move at the rate of 35 feet a second.
4. A counterpoise or weight to keep the endless cable in a suitable state of tension at the opposite end of the hydraulic wheels, and to travel on a waggon between these and a great well sunk purposely to receive a corresponding weight at the end of a rope.

\* This and the previous articles are the result of personal observation in the countries mentioned.